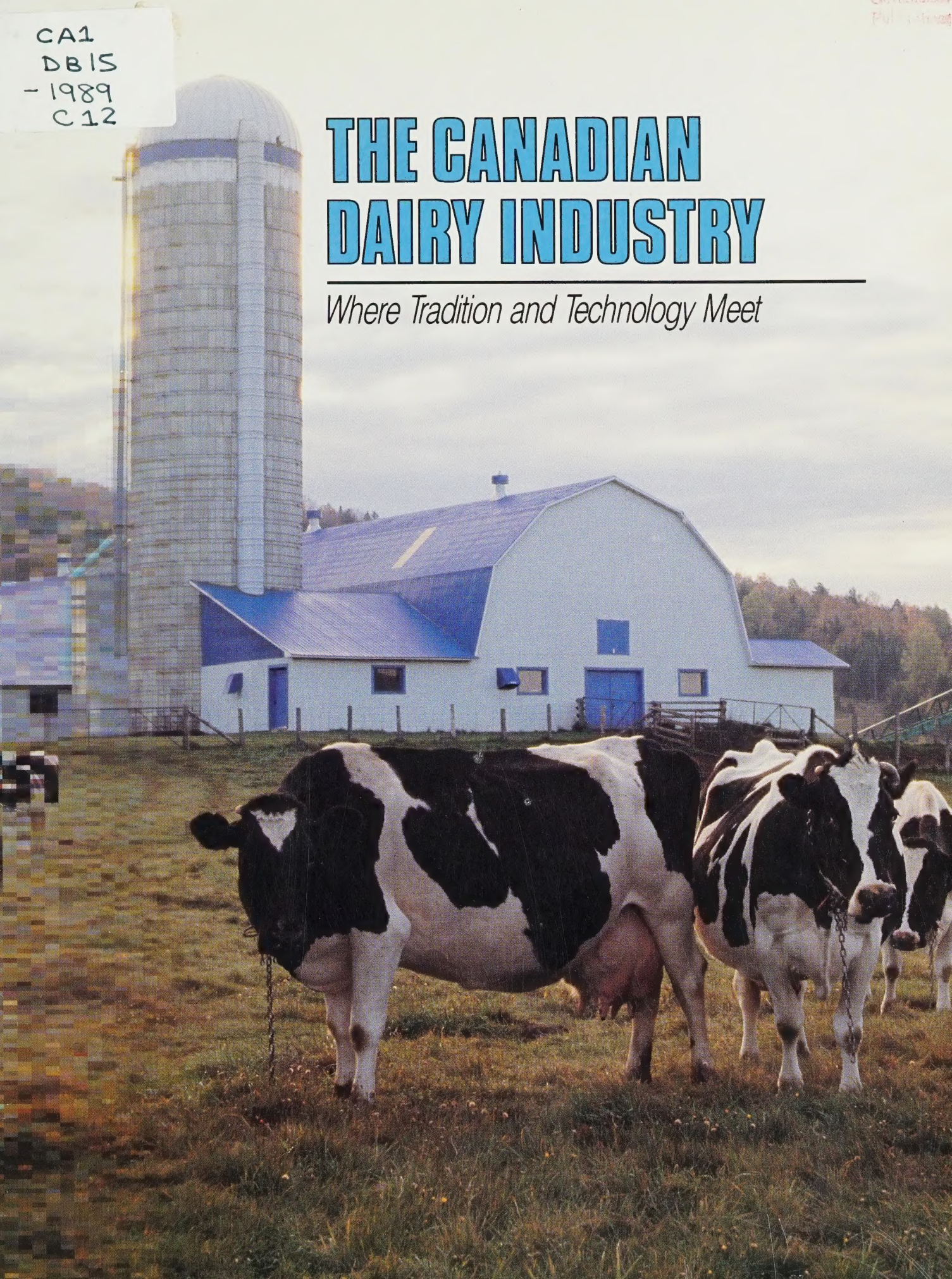



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# THE CANADIAN DAIRY INDUSTRY

*Where Tradition and Technology Meet*







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# THE CANADIAN DAIRY INDUSTRY

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*Where Tradition and Technology Meet*



Cette publication est aussi disponible en français sous le titre : L'industrie laitière canadienne : l'intégration de la tradition et de la technologie.



## H I G H L I G H T S



### ***From the farm . . .***

Dairy farming is one of Canada's most important agricultural activities, generating over \$3.8 billion in farm cash receipts for milk and dairy cattle sales in 1988. This represented 17 percent of total farm cash receipts, second only to the grain sector.



### ***to the plant . . .***

The dairy processing industry is a vital part of the Canadian economy with shipments valued at approximately \$7 billion in 1986. It is the second largest food processing sector, after meat and meat products, accounting for over 16 percent of the estimated value of shipments from all food and beverage industries.



### ***to the dairy case.***

The Canadian dairy case now yields an amazing variety of milk-based products. Over the last twenty years, numerous specialty cheeses, dairy desserts, yogurts and yogurt drinks, gourmet ice cream and ice cream novelties have been added to staples such as milk, cream, butter and cheddar cheese.

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## CANADA AT A GLANCE 1989

### Area

Canada is the second largest country in the world, with an area of 9,970,610 kilometres.

### Population

June 1, 1989 26,218,500

### Provinces and Territories

|                       |           |
|-----------------------|-----------|
| Newfoundland          | 570,000   |
| Prince Edward Island  | 130,200   |
| Nova Scotia           | 886,800   |
| New Brunswick         | 718,500   |
| Quebec                | 6,688,700 |
| Ontario               | 9,569,500 |
| Manitoba              | 1,084,200 |
| Saskatchewan          | 1,007,000 |
| Alberta               | 2,429,200 |
| British Columbia      | 3,055,600 |
| Yukon                 | 25,400    |
| Northwest Territories | 53,400    |

### Urban vs. Rural

Percentage of population 1986

|                 |    |
|-----------------|----|
| Urban           | 76 |
| Rural: Farm     | 4  |
| Rural: Non-Farm | 20 |



Source: Statistics Canada



### Number of Dairy Cows, 1986

1 dot = 500 dairy cows

Source: Statistics Canada

# DAIRY FARMING

## *A Dramatic Evolution*

Dairy farming is one of Canada's most important agricultural activities, generating over \$3.8 billion in farm cash receipts for milk and dairy cattle sales in 1988. This represented 17 percent of total farm cash receipts, second only to the grain sector.

In Quebec, Ontario, British Columbia, New Brunswick and Nova Scotia, dairying ranked first in terms of farm cash receipts while in Prince Edward Island and Newfoundland, it ranked second.

### **Number of Dairy Farms 1988-89 Dairy Year**

|                      |               |
|----------------------|---------------|
| Newfoundland         | 72            |
| Prince Edward Island | 703           |
| Nova Scotia          | 707           |
| New Brunswick        | 599           |
| Quebec               | 15,652        |
| Ontario              | 11,454        |
| Manitoba             | 2,283         |
| Saskatchewan         | 1,657         |
| Alberta              | 2,340         |
| British Columbia     | 1,050         |
| <b>Canada</b>        | <b>36,517</b> |

*Sources: Canadian Dairy Commission,  
Newfoundland Milk Marketing Board*

In 1988-89, there were approximately 36,500 dairy farms in Canada: 74 percent of which were in Quebec and Ontario, 20 percent in the West and 6 percent in the Atlantic provinces. Total milk production from these farms was approximately 78.6 million hectolitres.

Although the number of farms has steadily declined in the last twenty years, from approximately 153,000 in 1968-69, the amount of milk produced has remained essentially the same, neither increasing nor diminishing significantly.



There are a number of reasons for this consistency in production. Although the trend is toward fewer farms, they are becoming larger. The average dairy farm now has 40 cows, almost double the number reported fifteen years ago. Better feeding, disease control and genetic advancements have also increased the amount of milk produced per cow.

For example, in the last five years, total milk production has increased by 2.9 percent in spite of a 14 percent decline in cow numbers and a 22 percent drop in farm numbers. The remaining dairy farms shipped an average of 32 percent more milk, enlarging their herd size by 11 percent and milk yields per cow by 19 percent.

### **MILK YIELDS PER COW**

In 1988, dairy cows on official milk recording programs produced an average of 6,872 litres of milk, which compares favourably with cows from other countries. This yield has been increasing steadily. In 1983, the average recorded yield was 6,273 litres per cow.



*A modern milking parlour.*



## BREEDS OF DAIRY CATTLE

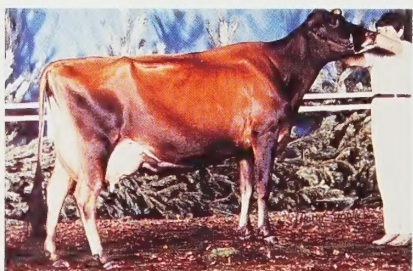
As of January 1, 1989, there were 1,449,100 milk cows in Canada, primarily of the following breeds: Holstein, Ayrshire, Jersey, Guernsey, Brown Swiss, Canadienne, and Shorthorn.



**Holsteins** originated in Holland and were first brought to Canada in 1881. Today, over 85 percent of the Canadian dairy herd is Holstein. Black and white or red and white in colouring, the breed is characterized by its large size and its exceptional milk production.



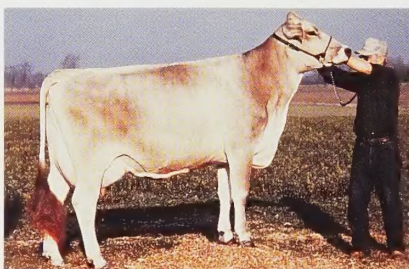
**Ayrshires** were introduced to Canada from Scotland around 1821. Their coat is light or dark red and white in varying proportions. Roughly one-half of Canada's Ayrshires are found in Quebec.



**Jerseys** originated on the island of Jersey and were first brought to Montreal in 1868. These fawn-coloured cows are noted for their high butterfat and protein milk tests.



**Guernseys** were developed on the island of Guernsey and brought to Canada in 1876. Comparable in size to Ayrshires, they are golden in colour with distinctive white spots.



**Brown Swiss** cows originated in Europe, particularly Switzerland, and were introduced to Canada in 1888. These cattle cross well with beef breeds.



The **Canadienne** breed, which was developed from the Breton and Norman cows of New France, is found mostly in Quebec. The cows are black or brown, although the back, muzzle and udder are generally paler.



**Shorthorns** originated in England and were first imported in 1832. They are red, white or roan and are used mainly as a dual-purpose (milk and beef) breed.

## FARM MANAGEMENT

Milk producers constantly strive to improve their efficiency in order to maintain the viability of their enterprise. They are required to develop expertise in a number of areas which impact on the performance of their operation.

In planning production goals, producers operate within the framework of national and provincial milk pricing and quota systems. They must understand these systems and carefully plan their level of production to fill but not exceed quota holdings.

A healthy herd is a prerequisite for a profitable dairy operation, as is good reproductive performance. Artificial insemination is already widely used to introduce superior genetic material into the herd and embryo transplants and gene manipulation will increasingly be used in future. By careful observation of the herd, producers can minimize the average calving interval and maintain optimum reproduction efficiency.

The majority of producers participate in milk recording programs to monitor improvements in their herd and to develop cows through breed selection which have the traits necessary to produce large quantities of quality milk. In 1988, 57 percent of Canadian dairy cows were enrolled in milk recording programs. Many producers also enroll their cows in herd health programs which include regular visits by veterinarians.



*A visit from the vet.*



Feed represents a very significant part of the cost of milk production in Canada. In some parts of the country, the difficult climate challenges producers' ability to make the optimum use of forages and supplementary feeds. This climate also requires that cattle be housed for many months of the year.

Producers attempt to meet but not exceed the nutritional needs of dairy cattle. The balance is critical. If requirements are not met, milk production will drop and the animal's health may suffer. If requirements are exceeded, feed costs are unnecessarily high.



*A motorized bale-feeder.*

Climate and soils vary widely within Canada. In the Maritimes, forage production is favoured and much of the feed grain is purchased. There is some production of corn silage although it is not as popular now as it was a few years ago.

There is somewhat less emphasis on purchased feed in Quebec. About half of the dairy farms in the province rely on barley, a lesser number on oats and about a fifth are able to grow grain corn. Ontario producers rely much more heavily on home-grown grain, with corn as the main crop.

Prairie producers, like those in Ontario, grow a large percentage of their grain, with a much greater emphasis on cereal silage. Producers in British Columbia grow their forages and purchase a high percentage of their grain requirements.

Today's dairy farm represents a considerable capital investment in land, buildings, machinery, equipment and livestock. Like good business executives, milk producers must be skilled in budgeting, cash flow

### **TYPICAL CANADIAN DAIRY FARM**

The typical Canadian dairy farm is quite specialized, with most of its revenue coming from milk production and the sale of dairy cattle. It is a family-owned operation with a herd of about 40 Holstein cows, milking or to be milked. The owners are in their mid-forties and have built up considerable equity in their operation. Their total farm activities generate about \$138,000 in gross sales per year.

The image some Canadians may have of a typical dairy farm is of a rustic operation isolated from the technological progress that so affects urban lives. Such is not the case; the impact of research and technology on the dairy enterprise is very obvious.

Hardier crops, feed supplements and improved livestock are just some of the benefits research has provided. The typical farm family is accustomed to advanced technology in such practices as artificial insemination, breed selection and labour-saving milking systems. Computerization of feeding and herd management systems, biotechnological advances and equipment innovations are rapidly changing the way things are done on the farm.

analysis and debt management. They must constantly be aware of costs and events

which might impact on returns from the dairy business.





# DAIRY PROCESSING

## *A Vital Industry*

The dairy processing industry is a vital part of the Canadian economy with shipments valued at approximately \$7 billion in 1986.<sup>1</sup> It is the second largest food processing sector, after meat and meat products, accounting for over 16 percent of the estimated value of shipments from all food and beverage industries.

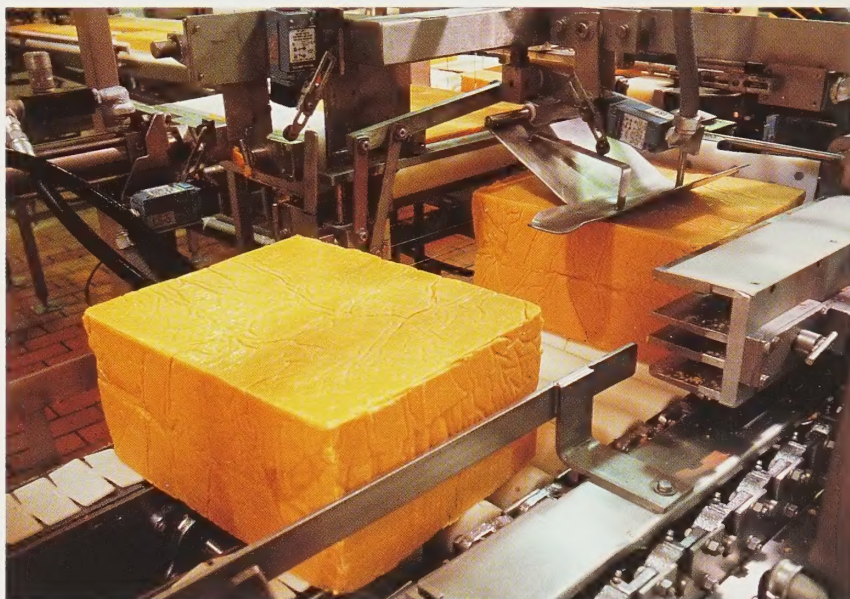
In 1986, there were 393 plants in Canada processing fluid and industrial milk products. These plants provided employment for over 26,000 people and paid approximately \$712 million in salaries and wages. The industry was also indirectly responsible for thousands of other jobs in transportation, packaging, and in the storage and marketing of dairy products.

### **STRUCTURAL CHANGES IN THE DAIRY PROCESSING SECTOR**

From 1966 to 1986, the industry underwent significant rationalization, resulting in higher concentration of ownership and a 70 percent decrease in the number of Canadian plants, from 1,308 to 393. This period also saw an 18 percent decrease in the total number of employees, from 31,845 to 26,201. However the volume of milk processed per plant increased by 229 percent in the same period.

These structural changes and the resulting rationalization can be attributed to a number of factors. The national dairy policy stimulated corporate acquisitions which led to the closing of inefficient plants and the opening of modern, integrated processing facilities. Increased urbanization and a growing health consciousness created a demand for new products. Metric conversion enabled processors to purchase the newest in European technology.

<sup>1</sup>The statistics in this chapter are all from 1986, the latest available from Statistics Canada at time of printing.



### **REGIONAL DISTRIBUTION AND ECONOMIC ACTIVITY**

Dairy processing plants are located in every region of the country. Milk is processed in two general categories: fluid (table milk and cream) and industrial (dairy products such as butter, cheese, ice cream, yogurt). Of the 393 dairy plants in Canada in 1986, 233 were industrial plants and 160 were fluid processing operations.

The industry is centred primarily in Ontario and Quebec. These two provinces, accounting for approximately 72 percent of total Canadian milk production, were home to 254 fluid and industrial processing plants in 1986. Ontario had the greatest number of plants (146) while Quebec had the largest number of employees and the highest value of shipments of manufactured goods at 8,844 employees and \$2.65 billion, respectively.

Value added (which refers to the increase in the value of a good as it moves from one stage of production to the next) from these

two provinces totalled \$1.29 billion or 73 percent of the Canadian dairy processing industry total.

British Columbia, Alberta and Manitoba were the next most important dairy processing provinces in terms of economic activity.

#### ***Dairy Processing Industry Number of Establishments by Province 1986 (Fluid and Industrial)***

|                      |            |
|----------------------|------------|
| Newfoundland         | 4          |
| Prince Edward Island | 13         |
| Nova Scotia          | 14         |
| New Brunswick        | 9          |
| Quebec               | 108        |
| Ontario              | 146        |
| Manitoba             | 19         |
| Saskatchewan         | 15         |
| Alberta              | 37         |
| British Columbia     | 28         |
| <b>Canada</b>        | <b>393</b> |



### **Milk Utilisation\* Fluid and Industrial (1986)**

|                  |              |
|------------------|--------------|
| Butter           | 32%          |
| Cheddar Cheese   | 14%          |
| 2% Milk          | 13%          |
| Specialty Cheese | 13%          |
| Whole Milk       | 10%          |
| Cream            | 7%           |
| Ice Cream        | 7%           |
| Sour Cream       | 1%           |
| Yogurt           | less than 1% |
| Skim Milk        | less than 1% |
| Cottage Cheese   | less than 1% |
| All Others       | less than 2% |

*\*based on butterfat:milk equivalent*

### **INDUSTRIAL MILK PROCESSING SECTOR**

Manufacturing activity was greatest in the industrial milk processing sector: \$3.74 billion worth of dairy products with a value added of \$904.4 million in 1986. That same year, the industrial sector employed 12,554 people and paid more than \$326 million in wages and salaries.

Although Ontario had the greatest number of plants (96 in 1986), Quebec had the highest value of shipments (\$1.96 billion) accounting for 53 percent of the value of total industrial shipments. Alberta ranked next to Ontario and Quebec in 1986, with dairy products valued at \$314 million.

### **FLUID MILK PROCESSING SECTOR**

Fluid milk processors shipped \$2.93 billion worth of goods, employed 13,647 people and paid salaries and wages in excess of \$385 million in 1986.

Because the distribution of fluid milk processing operations parallels population distribution, the three provinces with the largest populations rank as the top three in terms of fluid milk processing. This industry is most important in the province of Ontario where approximately one-third of all fluid plants are located. In 1986, Ontario plants processed approximately one billion litres of milk and accounted for 37 percent of the value of total fluid shipments. Quebec and British Columbia ranked second and third with values of shipments of manufactured goods in 1986 reported at \$686.4 million and \$509.1 million respectively.



### **PROFITABILITY AND INVESTMENT**

The dairy processing sector's after-tax profits are moderate when compared to several other food and beverage industries. From 1978 to 1986, after-tax profits as a percentage of total income in this sector were between 2 and 3 percent.

Between 1980 and 1988, dairy processors invested a total of \$1.6 billion, the highest within the food industry. Most of the investment in this sector has been on new construction and updating machinery and equipment. Canadian processors are installing computerized control systems at all stages of production. They have also

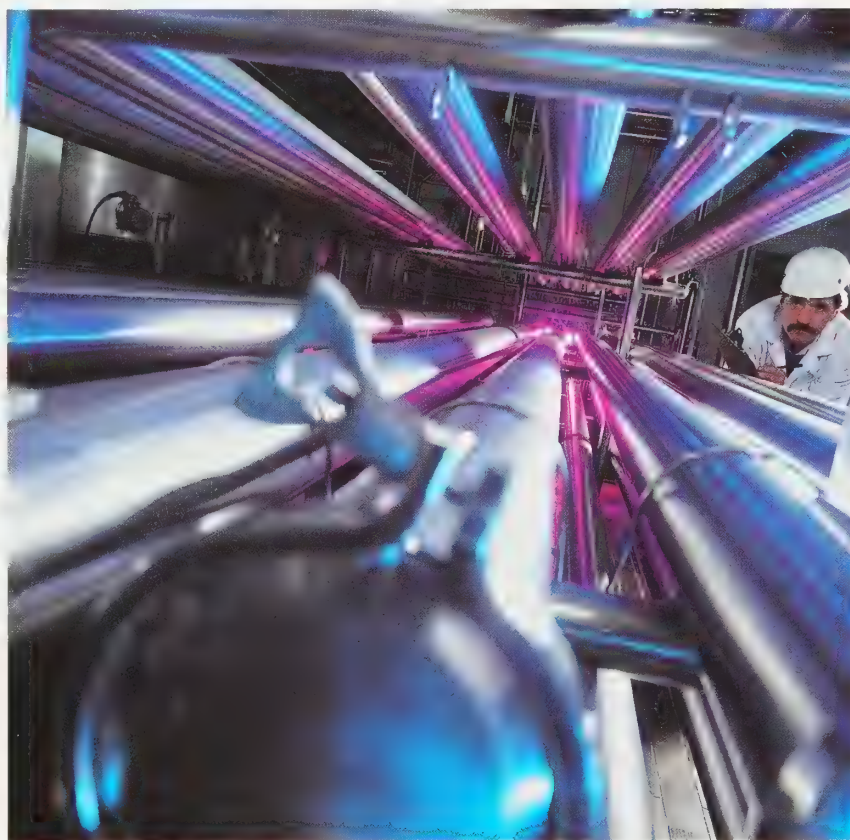
developed U.H.T. processing systems for long-life milk products and strive to be in the forefront of new milk product development.

### **DAIRY COOPERATIVES**

Dairy cooperatives are producer-owned businesses, run by professional management teams, involved in the processing and marketing of dairy products. Since a share of the profits is paid to members, they serve as a secondary source of income for producers. In provinces where marketing boards do not exist, cooperatives serve as a secure outlet for the milk produced by its members.

Cooperatives are a very important part of the Canadian industry. According to a 1988 survey of processors, cooperatives account for approximately 48 percent of dairy products marketed (in terms of dollar value), corporations 36 percent and privately-owned businesses 16 percent.

There are 29 dairy cooperatives in the country. Although the greatest number are located in Quebec and Ontario, dairy cooperatives are very important in the Prairies, British Columbia and the Maritimes, in terms of volume processed, particularly in the industrial sector.



*An ultra-filtration system to separate milk proteins and sugars*

# DAIRY PRODUCTS

## *Choice and Quality*

The Canadian dairy case now yields an amazing variety of milk-based products. Over the last twenty years, numerous specialty cheeses, dairy desserts, yogurts and yogurt drinks, gourmet ice cream and ice cream novelties have been added to staples such as milk, cream, butter and cheddar cheese.

Dairy products combine great taste with nutritional value. And as one of the four basic food groups, they play an important part in human nutrition by providing essential nutrients for growth and body maintenance throughout our life span.

### FLUID MILK

There are three major types of fluid milk: homogenized (3.25% b.f.), partly skimmed (2%) and skim (0%). In addition, consumers in many provinces may now buy a 1% skim.



From the three main types stem other products such as flavoured milk and lactose-free milk. Cream is marketed with different butter-fat contents, from 10 percent for coffee to 35 percent for whipping.

From 1978 to 1988, total fluid milk sales increased by 10.5 percent, from 24.7 to 27.4 million hectolitres.



There has been a significant switch in the past two decades from the consumption of homogenized to partly skimmed milk. Consumption of homogenized milk has dropped from 12.6 million hectolitres in 1970 to only 7.2 million hectolitres in 1988, a decline of 43 percent. The consumption of 2% milk has grown from 6.4 million hectolitres in 1970 to 16.8 million hectolitres in 1988, an increase of 163 percent. Skim milk has more than doubled its consumption level since 1970 from 0.6 to 1.5 million hectolitres.

### DAIRY PRODUCTS

The total **cheese** market has grown significantly over the last ten years, from 183.9 million kilograms in 1978 to 275 million kilograms in 1988, an increase of 49.5 percent. The major gain has been in the specialty cheese market (all natural cheeses except cheddar and cottage) which has almost

doubled in this period. The total cheddar market has improved as well by 35.7 percent.

The **butter** market has suffered as a result of increased competition from margarine, the general trend to low-fat products and the overall decline of the spreads market. Butter sales declined by 28 percent between 1970 and 1977, 4.5 percent per year, while margarine sales increased by 52 percent. This trend was effectively curtailed with butter sales decreasing only 7 percent from 1978 to 1988, or 0.7 percent per year, while margarine sales increased by the same amount in that period.

The **yogurt** market has been growing at a double-digit pace. Since 1983, yogurt has had an average annual growth rate of 13.5 percent according to Statistics Canada. This market expansion can be largely attributed to the perception of yogurt as an important part of a healthy diet.



## PER CAPITA CONSUMPTION

The following table clearly demonstrates these trends in the per capita consumption of dairy products by Canadians:

|      | Litres                |           |        | Kilograms |                   |                     |                     |                 |
|------|-----------------------|-----------|--------|-----------|-------------------|---------------------|---------------------|-----------------|
|      | Table Milk<br>& Cream | Ice Cream | Yogurt | Butter    | Cheddar<br>Cheese | Processed<br>Cheese | Specialty<br>Cheese | Total<br>Cheese |
| 1973 | 104.39                | 12.50     | 0.62   | 6.01      | 2.01              | 1.83                | 1.71                | 5.65            |
| 1978 | 105.78                | 12.22     | 1.68   | 4.56      | 1.34              | 2.17                | 3.29                | 6.80            |
| 1983 | 107.84                | 12.51     | 1.89   | 4.36      | 1.47              | 2.21                | 3.91                | 7.59            |
| 1988 | 109.23                | 12.39     | 3.24   | 3.86      | 2.14              | 2.25                | 5.52                | 9.91            |



Sources: Statistics Canada, Agriculture Canada

## GENERIC PROMOTIONAL ACTIVITIES

In Canada, milk producers have assumed financial responsibility for the generic promotion of dairy products for more than thirty years. This type of promotion is not related to brand names but highlights the qualities of a particular dairy product. Canada is the world leader in this type of promotion. Fluid milk, butter and cheese have been the main products targeted by these advertising and promotion campaigns. This support amounted to about \$45 million in 1988.

While each province is responsible for the promotion of fluid milk within its boundaries,

activities relating to dairy products are national and therefore handled by the Dairy Bureau of Canada which is entirely funded by milk producers.

Producers have to take into account the butterfat utilization of products and the size of each market in order to determine and recommend priorities for promotional activities. This is particularly true of the **industrial** market where there has been a dramatic shift in butterfat utilization since 1975. Whereas 62.5 percent of industrial milk went into butter in 1975, this had dropped to 45.6 percent by 1986. Cheese (cheddar, specialty and cottage) went from 21.9 per-

cent utilization to 37 percent in the same period.

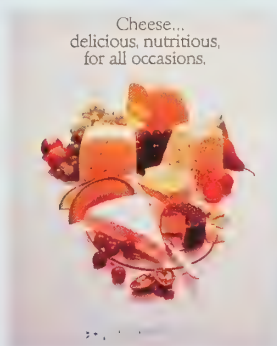
Because of the importance of butter and cheese in butterfat utilization, they have been, and continue to be, the focus of most industrial milk promotional programs.

## BRAND PROMOTION AND ADVERTISING

Canadian processors spent approximately \$45.5 million in 1987 on media advertising for their wide variety of products. They regularly participate in joint ventures with the Dairy Bureau of Canada.



A television ad for butter.



A cheese poster.

## Branded by the cow!



A magazine ad for milk bread.

# FEDERAL AND PROVINCIAL RESPONSIBILITIES

## *A Shared Jurisdiction*

While the federal government has jurisdiction over trade between provinces and with other countries, the provinces retain responsibility for trade within their own borders. This creates two markets for milk in Canada: the industrial market (dairy products) which is federal and the fluid market (table milk and cream) which is provincial.

### *Federal Responsibilities*

Canada has developed a national dairy policy which has earned the respect of many other dairy-producing countries. The Canadian Dairy Commission, a Crown Corporation created in 1966, has played a key role in the evolution and implementation of this policy. Working closely with producers, processors, provincial milk marketing boards and exporters, the Commission advises the Minister of Agriculture on dairy matters and develops policies and programs to meet the needs of the industry while providing Canadians with adequate supplies of quality dairy products.

A number of federal government departments also have responsibilities in the dairy area. Agriculture Canada's mandate includes product standards, product grading, plant inspection, dairy research, livestock development, and animal health. The Department also administers a number of programs which have a direct or indirect impact on milk producers.

Import controls on dairy products are administered by the Department of External Affairs. Health and Welfare Canada monitors the safety of dairy products while Consumer and Corporate Affairs Canada looks after regulating package labelling and related issues.

### **KEY ELEMENTS OF THE NATIONAL DAIRY POLICY**

- milk supply management through market sharing quotas;
- import controls on dairy products;
- establishment of a target price for industrial milk based on cost of production data;
- federal support for the target price through direct payments to producers and support prices for butter and skim milk powder.

### **THE NATIONAL DAIRY POLICY**

Canada adopted a system of supply management for industrial milk in the early seventies which has brought stability to the dairy industry. Gone are the erratic fluctuations of the fifties and sixties which resulted in unstable markets, uncertain supplies and highly variable revenues for producers and processors. Milk supply management is the cornerstone of Canada's national dairy policy.

#### **National Milk Supply Management**

The purpose of milk supply management is to provide a balance between the supply of industrial milk and the demand for dairy products such as butter, cheese, ice cream and yogurt.

The market is therefore supplied by Canadian milk production, except for some cheese imports and certain dairy products not available from domestic sources.

The Canadian Milk Supply Management Committee oversees the application of the National Milk Marketing Plan, the federal-provincial agreement that governs milk supply management in Canada. Chaired by the Canadian Dairy Commission, the Committee has representation from producers and governments from all provinces, except

Newfoundland which does not produce significant amounts of milk for industrial purposes.

The Committee sets a national production target or Market Sharing Quota which is monitored and adjusted periodically to reflect changes in demand. Each province allocates its share of the national quota to its producers according to its own policies.

Under the Plan, milk producers assume responsibility for the costs of exporting dairy products which are not consumed in Canada. For this purpose, levies are collected by provincial marketing boards and remitted to the Commission to cover expenses related to the export of these products.

#### **Import Controls on Dairy Products**

In order to operate its national milk supply management system, Canada has a wide range of measures to monitor and control imports of dairy products. Without these measures, the stability provided by the national dairy policy would be undermined by imports which are often highly subsidized by the countries who export them.



The Canadian government has established import controls which are administered by the Department of External Affairs under provisions of the *Export and Import Permits Act*.

### Target Price for Industrial Milk

The target price is the level of return efficient milk producers should receive to cover cash costs, labour and investment related to their production of industrial milk.

The cost of producing milk is calculated from data collected on approximately 350 farms in Ontario, Quebec and New Brunswick. Thirty percent of the sample, the producers with the highest costs, is eliminated and only the costs of the other seventy percent are taken into account as they represent the most efficient producers.

Since the mechanism measures actual costs on the farm on an annual basis, it ensures that changes in the cost of producing milk are reflected promptly in the pricing structure. Accordingly, consumers directly benefit from increases in productivity and other factors which reduce production costs.

### Support for the Target Price

The federal government supports the target price for industrial milk in the marketplace through two programs of the Canadian Dairy Commission.

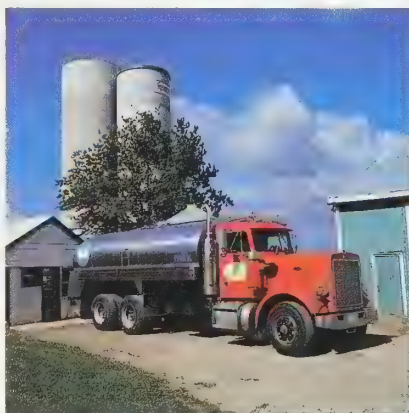
Producers receive **direct payments** from the government on deliveries of industrial milk and cream produced to meet domestic requirements. These payments also moderate the price consumers pay for dairy products thus stimulating consumption and contributing to the maintenance of a sizeable dairy industry.

By setting **support prices for butter and skim milk powder** and offering to purchase product at those prices, the government also provides a mechanism whereby producers can achieve the target price for their milk. Support prices, which also include a processor margin, are used as a guideline by the provincial marketing agencies for their own pricing levels. The offer-to-purchase program allows the Commission to hold butter stocks in reserve, thus ensuring a plentiful supply at all times.

## Provincial Responsibilities

The provinces govern all aspects of the fluid milk market, aiming for self-sufficiency in table milk and fresh cream and a stable environment for local dairy industries.

In all provinces, certain legislated powers are delegated to milk marketing boards and/or government milk control agencies. In most cases, these boards and agencies license producers, allocate quota, establish and administer quota policies and regulate milk prices according to production costs and product utilization. Marketing boards in some provinces may also negotiate transportation costs with representatives of milk transportation firms. In all cases, provincial departments of agriculture retain control of milk quality programs and set minimum sanitation standards at the production and processing levels.



The authority to market milk is delegated by provincial governments, and in some cases, government agencies exercise the marketing powers that the legislation provides. In five provinces, however, milk is marketed through organizations which are financed and managed by producers and which function more or less independently of provincial political structures. In Ontario, for example, the Ontario Milk Marketing Board is an independent producer organization, to which authority is delegated from the Ontario Ministry of Agriculture and Food via the Farm Products Marketing Commission. In Quebec, the governmental agricultural marketing board (Régie des marchés agricoles du Québec) delegates authority for marketing activities to producers' organizations; in the case of milk, to the Fédération des producteurs de lait du Québec.

Each province takes responsibility for meeting the table milk and fresh cream requirements of its own residents. Fluid milk production quotas are allocated to individual producers based on projected province-wide demand and each province also allocates its share of the national industrial milk quota.

Provinces establish price levels for their milk to ensure a fair return to their producers and processors and a fair price to consumers. In some cases, like that of the Prince Edward Island Marketing Council, provincial agencies set fluid prices at any or all of the producer, wholesale and retail levels. Some marketing agencies pay producers directly for all milk produced, based on the type of quota held.

Fluid milk price calculations are intended to reflect production costs on the farm, but the methods of calculation vary widely from province to province. In some cases, the price is indexed from a historical level, while other provinces conduct regular cost of production surveys upon which pricing calculations are based.

Some provinces have more than one agency which control milk marketing activities. One provincial body might set producer quotas while another might set the price. Some provinces delegate the pricing of fluid and industrial milk to two separate organizations.

In Quebec, the Fédération des producteurs de lait du Québec does not set a price directly, but, based on cost of production information, submits a request to the Régie des marchés agricoles du Québec, which establishes a price for fluid milk, after holding public hearings. The Fédération negotiates the price for industrial milk with two processors' associations: la Coopérative Fédérée de Québec and le Conseil de l'industrie laitière du Québec.



An udder health technician giving advice to a producer.

# FOOD SAFETY AND QUALITY CONTROL

## *An Enviably Record*

Quality control begins on the farm. Provincial departments of agriculture carry out milk testing programs at the producer level. In most cases, milk quality affects the price producers get for their milk through a penalty system. Standard tests detect unsafe bacteria levels, the presence of added water, as well as antibiotics and other bacterial inhibitors. These tests include somatic cell counts as an indication of udder health. Specific provinces administer additional tests according to regional concerns. For example, British Columbia tests for pesticide residues and Alberta tests for sulpha drugs.

In the processing plants, provincial inspectors monitor products for quality and safety, checking for harmful bacteria as well as for chemical impurities, like pesticides or herbicides.

The federal government registers the plants which process industrial milk into products like butter, cheese, dry milk, frozen dairy products and condensed milk destined for interprovincial or international markets. It also oversees industry application of the grade marks on butter, cheddar cheese and dry milk powders. Registered plants, shipping out of province or using grade marks, must meet minimum standards set by



*Milk quality testing*

Provincial and federal regulatory agencies often cooperate. Inspectors from one sector will alert their counterparts in the other if there is a specific problem in a plant. In the cases of Ontario and Quebec, provincial inspectors conduct federal inspections, subject to federal audit.

Processors themselves are concerned with product quality and safety. The Technical Committee of the National Dairy Council of Canada conducts workshops and produces the Good Manufacturing Practices Guidelines on behalf of the industry. These workshops and guidelines cover key subjects of dairy product safety and quality.

Dairy products are also subject to testing at the retail level. Consumer and Corporate

Affairs Canada, in conjunction with Agriculture Canada and Health and Welfare Canada, tests dairy products at random to verify their composition. Some provincial agriculture and health departments and several municipal governments also monitor dairy products at retail outlets to ensure consumer safety.



*Cheese inspection*

Agriculture Canada's Food Inspection Directorate and are subject to in-depth inspections as well as microbiological and chemical testing of their products.



# DAIRY RESEARCH AND TECHNOLOGY

## *Adaptation and Innovation*

The results of research and technological developments affect every aspect of the dairy industry, from the cow to the final product. Any party with a stake in dairy has a stake in research.

Canadian dairy research is conducted mainly in federal and provincial research centres, academic institutions and private laboratories and is sponsored by public and private funds. With initiatives from so many quarters, Canadian researchers have recognized the benefits of sharing results with each other and with industry through technology transfer programs.

### **RESEARCH HIGHLIGHTS**

Canada's excellent reputation for dairy stock is due in part to the research contributions of breeders and the artificial insemination industry as well as those of animal scientists. The application of artificial insemination utilizing young sire proving techniques and the selection of only the very best proven sires have been effectively exploited by Canadian dairy cattle breeders.

Technological advances in embryo transfers, embryo splitting and cloning are also being applied. Canadian companies have developed techniques which permit the export of dairy cattle embryos and in 1988, embryos worth \$4 million were exported.

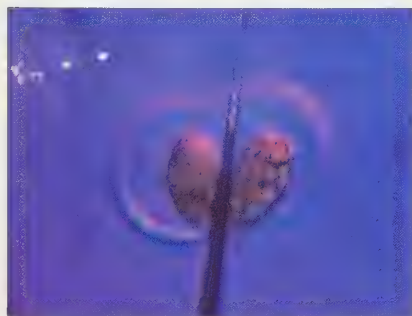


By applying statistical models developed through international research, Canada has been at the forefront of genetic evaluation methodology. This expertise supports the selective breeding practices responsible for the steady improvement of Canadian dairy cattle.

Researchers at MacDonald College and in federal laboratories have identified, at the DNA level, the genetic traits in cattle linked to the capacity to produce certain proteins in their milk, or to sire offspring capable of producing these proteins. The genetic coding for the production of two types of casein have been discovered. This knowledge may be used to improve milk quality and overall milk yields of cattle.

Researchers at the Universities of Alberta and Manitoba are investigating the Canadian-developed full fat canola seed as possible feed for lactating cows. Other developments in animal feed have allowed milk producers to use agricultural by-products of the cereals, cheese, potato and fish industries to augment protein and feed requirements while promoting a cleaner environment.

Federal researchers and University of Guelph scientists hope to improve the efficiency of feed utilization by ruminant animals by altering the genetic structure of the bacteria in the rumen to improve fibre digestion and protein quality. Canada is at



*Embryo splitting.*

the forefront of this technology. Any improvements in feed utilization translate into large increases in the production efficiency of ruminant animals.

The effects of the growth hormone somatotropin on dairy cattle have been examined and less costly, chemically produced alternative products such as somatotrocinin are being studied.



*A field of alfalfa*

Grasses, used as forage for cattle, remain a major area of research at the federal level and scientists have produced a hardy variation of alfalfa more suitable to the Canadian climate.

In the realm of herd management, the effect of microcomputer herd management systems on dairy herd performance is being studied. Meanwhile, the University of British Columbia, in conjunction with private industry, is developing a computerized feeding system to lighten the labour required by the farming operation.

Federal scientists have improved the quality and yield of cottage and cheddar cheeses. Greater whey utilization has been achieved in animal feeds and through the development of new whey-based dairy spreads. Federally-run laboratories have developed a hydrolized soluble skim milk product for fruit drinks and baby foods as well as new procedures for the manufacture of frozen yogurt.

There have been exciting developments in milk quality and dairy processing research. At the University of Laval, work has uncovered a way of improving the quality and the quantity of cheddar cheese yields from milk by introducing a supplemental starter bacteria which inhibits the detrimental effects of other bacteria. At the University of British Columbia, researchers have done extensive

## NOTABLE ACHIEVEMENTS

Canada has a long history of forging new ground in dairy research. The inception of the Dominion Experimental Farms system in 1886 marked the beginning of active governmental participation in the development of the dairy industry. These farms demonstrated proper dairying techniques and developed high quality cattle suited to the hardy Canadian climate.

Scientists like Doctors E. G. Hood and Arthur H. White, who were instrumental in improving the quality of cheese and butter in the forties and fifties, and Dr. C. K. Johns, who earned a world-renowned reputation for improving the quality of raw milk in the fifties and sixties, are examples of dairy researchers in the Canadian tradition.

Canadian aged cheddar, made with unpasteurized milk, is considered the standard to which cheese manufacturers around the world aspire. Oka, a semi-soft cheese developed by Trappist monks in Quebec, also enjoys a fine international reputation.

Celebrated internationally as the Super Cow, the Canadian Holstein was developed over a century by researchers and farmers who treated breed selection as a science. Canadian dairy cattle, adaptable to many climates, have long been recognized for their superior genetic traits and are in demand in an increasing export market which generates over \$60 million in cattle and semen sales. Record-breaking milk-producing cows in other countries are frequently traceable to Canadian genetic stock.



*Halhill Saga VG, a donor cow with some of her 20 embryo transfer calves born in a 14-month period.*

work to improve infant formulae based on milk components.

## GOVERNMENTAL SUPPORT FOR DAIRY RESEARCH

The Research Branch of Agriculture Canada is responsible for funding dairy-related work which is carried out at five research stations and two food research centres. The Branch has recently initiated some innovative cost

recovery programs. At the Food Research and Development Centre in St. Hyacinthe, Quebec, for example, facilities and resources may be contracted out to private industry for product development.

The federal government also provides funds to provincial academic institutions and individuals through the Natural Sciences and Engineering Research Council. This Council,





*Separating proteins and sugars in whey.*

in collaboration with Agriculture Canada, recently initiated the Research Partnership Support Program which matches funding from private industry.



*Food Research and Development Centre, St. Hyacinthe, Quebec*

Provincial governments also place a high priority on dairy-related research and direct their funding mainly through their universities. Some of these universities are developing more structured dairy science programs separate from food and agricultural science departments. Several provinces support provincial food research centres which also

provide facilities for scientists from the processing industry.

### **PARTICIPATION OF THE PRIVATE SECTOR**

To meet changing consumer tastes, needs and demands, dairy processors have invested a considerable amount in food research. Large food processing firms have participated mainly in the area of product development and packaging.

The Ontario Dairy Council, which represents processors, supports a dairy science chair at the University of Guelph. In Quebec, the Conseil de l'industrie laitière and the Coopérative Fédérée de Québec in cooperation with the Fédération des producteurs de lait du Québec financially support the Centre de recherche en sciences et technologie du lait (GREPA) at Laval University.

Some Canadian companies have established development laboratories in which they maintain staff researchers. Processors also underwrite projects at university dairy science departments with adequate facilities and resources to handle such contracts.

Most processors contract out a great deal of their projects to provincial and, increasingly, federal food research centres. More than ever, technological and economic developments pressure processors to develop new products and new technologies. At the same time, however, the rapid pace of changing technologies makes maintaining research and development facilities an almost impossible task. Food research centres provide processors with the best of environments and offer them a network of Canada's most renowned experts.

Research is also a key concern of artificial insemination enterprises. Semex, the international marketing arm of the Canadian industry, funds research chairs at several universities.

Milk producers also support large-scale research financially through their representative organizations. University dairy science departments as well as governmental research stations and food research centres benefit directly from producer funding initiatives.

In Saskatchewan, for example, producers have committed funds to animal science at the University of Saskatchewan and to the Veterinary Infectious Disease Organization (VIDO). Producers in Ontario will be supporting a chair in dairy science at the University of Guelph and providing scholarships to doctoral candidates conducting dairy research. Quebec producers have funded the Groupe de recherche en économie et politique agricoles (GREPA) at Laval University which specializes in agricultural economics.

The producer-funded Dairy Bureau of Canada supports research which affects the consumer. The national dairy promotion agency directed about \$1.5 million towards food research in 1988. The work sponsored by the Dairy Bureau is conducted in a climate of scientific objectivity and integrity, by recognized experts, mainly in university laboratories.

Nutrition is a top priority of the Dairy Bureau's science and technology budget. Recent efforts have focused on milk fat, as well as relationships between milk minerals and bone health, dental health, hypertension and cancers of the colon and breast. Current support for nutritional research may well revolutionize market attitudes about dairy products.

# CANADA AND THE INTERNATIONAL DAIRY SCENE

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Approximately five percent of the world's milk production finds its way into the international dairy market. Most of the trade involves easily stored products like butter, buttermilk, milk powders, condensed and evaporated milks, cheeses and whey products.

Since the purpose of its supply management system is to meet domestic requirements, Canada does not play a major role in the world dairy market. Meeting domestic requirements for butterfat results in a structural surplus of skim milk powder which has to be exported every year. In fact, Canada imports more dairy products than it exports, on a milk equivalent basis.

Canada exports mainly milk powders to developing nations and products such as aged cheddar and concentrated milk to certain traditional markets. All costs related to exporting these products are assumed by producers through levies which are collected by the provinces and remitted to the Canadian Dairy Commission.

In 1988, Canada exported a total of 59 million kilograms of skim milk powder worth \$91.7 million, with Mexico as the major single buyer. The Canadian International Development Agency (CIDA) purchases skim milk powder on a regular basis to provide food aid to developing nations.

Canada also exported whole milk powder, mainly to Algeria and Peru, and concentrated milk, shipped mainly to Libya and the Caribbean. These sales generated roughly \$43.7 million in 1988.

Total Canadian cheese exports in 1988 amounted to 10 million kilograms of product valued at \$40.6 million. Canada's reputation for quality has been founded in part on the excellence of its aged cheddar, considered the standard for this type of cheese around the world.



The United Kingdom has been importing Canadian aged cheddar for many years, as much as 84 million kilograms in 1900. The quantity of aged cheddar exported to the United Kingdom has declined over the years, especially since that country joined the European Economic Community and began to import EEC-produced cheese. Despite the challenges, demand for Canadian cheddar has remained strong. Of the 7.9 million kilograms of cheddar exported in 1988, 4.3 million kilograms was aged cheddar sold to this traditional market.

## THE SPECIAL ROLE OF THE CANADIAN DAIRY COMMISSION

The Canadian Dairy Commission, as a federal government agency, represents Canada on the international trading scene and

obtains access to markets, on a government-to-government basis, which might not otherwise be open to the Canadian dairy trade.

The Commission is involved in almost all of Canada's dairy product exports because they are either sold directly by the Commission from its stocks, or by private exporters under its Export Assistance Program.

The Commission recognizes the importance of maintaining private trade, vital to a well-balanced trading strategy. Because world prices are lower than Canadian prices, most private exporters receive export assistance to offset the cost differential. In the 1988-89 dairy year, exporters received \$33.9 million under the Commission's Export Assistance Program, which is entirely funded by producer levies.



# AN EXCEPTIONAL RECORD OF WORKING TOGETHER

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One of the characteristics of the dairy industry is the incredible amount of cooperation that exists between the various players. Each province has at least one milk marketing authority which represents the interests of the many industry participants. There are four main players on the national scene:



## **THE CANADIAN DAIRY COMMISSION**

The Canadian Dairy Commission plays a key role in the implementation of federal dairy policy and thus promotes the development and maintenance of a healthy and viable dairy industry in Canada. Working closely with producers, processors, provincial milk marketing boards and exporters, the Commission advises the Minister of Agriculture on matters relating to the dairy industry and develops policies and programs which meet the needs of the industry while providing Canadian consumers with adequate supplies of quality dairy products.



## **DAIRY FARMERS OF CANADA**

Dairy Farmers of Canada is the national lobby and policy organization representing all dairy farmers in Canada. It is a federation of provincial milk marketing boards, milk producers' associations, cooperatives and a national breed organization. Since its foundation in 1934, Dairy Farmers of Canada has been the voice of milk producers and was instrumental in the establishment of Canada's milk supply management program. The organization ensures that the views of dairy farmers are considered in any matter pertaining to the industry.



## **THE NATIONAL DAIRY COUNCIL OF CANADA**

The National Dairy Council of Canada is a non-profit association of Canadian processors and marketers of dairy products. Its purpose is to maintain a political, legal, regulatory, economic and social environment which provides members with the opportunity for viable dairy product manufacturing and marketing options. The Council's activities include the enhancement of the dairy processing sector, liaison with federal and provincial governments and all dairy-related organizations, dairy product promotion and international liaison.



## **THE DAIRY BUREAU OF CANADA**

The Dairy Bureau of Canada, which is funded by Canadian milk producers, encourages the consumption of dairy products through marketing, advertising and promotion activities. Other activities include working with various government agencies on issues such as advertising legislation, nutrition labelling and trademark violations; undertaking new product research and development, industry and market research projects, scientific research on the nutritional properties of dairy products and developing programs aimed at the food service sector and the food ingredients markets.

# CREDITS

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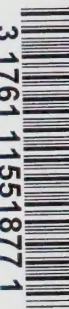


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